

5. CUMULATIVE IMPACTS

Cumulative impacts are defined as “...the impact on the environment which results from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 *CFR* 1508.7). Effects are considered cumulatively because significant effects are often the result of individually minor direct and indirect effects of multiple actions that occur over time. Cumulative effects should be considered over the “lifetime” of the effects rather than the duration of the action.

This section describes past and present actions, as well as reasonably foreseeable future actions, that are considered pertinent to the analysis of cumulative impacts for the proposed action. CERCLA activities that generate wastes are included in this section. It should be noted that considerable uncertainty as to scope and funding is associated with many of the future actions. Final decisions have not yet been made for some of these actions, and some are contingent upon additional NEPA analysis.

5.1 PADUCAH SITE ACTIVITIES

5.1.1 Environmental Management Program

The role of Environmental Management at the Paducah Site is to find, analyze, and correct site contamination problems as quickly and inexpensively as possible. Following is a list of ongoing Environmental Management projects with potential environmental impacts:

Paducah waste infrastructure

- construction of the C-746-U Landfill sedimentation pond discharge improvement.
- connection of C-746-U Landfill Phase 3 to leachate collection system.

Paducah waste operations

- performance of compliant operations of the C-746-U and C-746-S&T landfills.
- disposal of industrial waste/construction debris that met the waste acceptance criteria.
- analysis for a potential on-site CERCLA waste disposal facility.
- Paducah STP/MLLW project
- dismantling of the C-746-Q ⁹⁹Tc container.

Routine surveillance and maintenance

- pipeline isolation of abandoned fire water lines.

Long-term surveillance and maintenance

- working for uninterrupted Northwest/Northeast Plume Containment Systems for groundwater treatment.
- retrieval, staging, crushing and characterization of concrete rubble piles located on and off DOE property.

PAD Lasagna

The Paducah Site is a location of the Lasagna [TM] process for remediation of low-permeability soils. The Lasagna [TM] technology consists of emplacement of electrodes and use of direct current to

electro-osmotically move water and contaminants through in situ treatment zones. One novel aspect of the technology is the capability to reverse electrical polarity, thereby reversing flow direction to more effectively sweep contaminants through the treatment zones.

- Continuation of system operations.

PAD groundwater fence line action

- Conductance of Phase 1 Permeable Treatment Zone construction.
- Initiation of Phase 2 Permeable Treatment Zone construction.

PAD D&D C-410

- Pumping and treating water from basement of C-410 Complex.

Paducah Scrap Metal Removal and Disposal

The object of this project is to safely remove and disposition approximately 53,000 tons of contaminated scrap metal and miscellaneous materials contained in scrap yards. This project was initiated as a CERCLA project to address existing contamination and the potential release of hazardous substances to the environment.

5.1.2 Uranium Program

The Paducah Uranium Program has been established to provide surveillance and maintenance of DOE nonleased, inactive facilities and land areas not addressed by the Environmental Management program. There are a total of 15 inactive facilities and approximately 200 acres of land area that are maintained by the Uranium Program. Following is a list of ongoing Uranium Program projects with potential environmental impacts:

- Completion of cleanup of inactive facilities in accordance with cleanup plan.
- Maintenance of the deleased land acreage in a safe and compliant manner.
- Repaving Dyke and McCaw Road.

5.1.3 UF₆ Cylinder Storage

The mission of the UF₆ Cylinder Storage Program at Paducah is to maintain safe, long-term storage of the DOE UF₆ cylinder inventory until its disposition. The primary objective of the UF₆ Cylinder Storage Program is to implement the requirements of the Defense Nuclear Facilities Safety Board Recommendation 95-1 and applicable requirements of the Paducah Safety Analysis Report. The UF₆ cylinder storage facilities are Category II Nuclear Facilities as classified in accordance with the requirements of DOE Order 425.1A. The scope of work of the program includes surveillance and maintenance of cylinders transferred or scheduled to be transferred to DOE from USEC in accordance with the May 18, 1998, and June 30, 1998, memorandums of agreement between DOE and USEC. Following is a list of ongoing UF₆ Cylinder Storage Program projects with potential environmental impacts:

- restacking cylinders,
- annual cylinder inspections,
- quadrennial cylinder inspections,
- radiological surveys of cylinders,

- size reduction of G-yard concrete debris, and
- monthly sampling and monitoring of KPDES Outfall 017.

5.1.4 Depleted UF₆ Conversion Facility

In April 1999, DOE issued a final programmatic environmental impact statement, with preferred alternative, for long-term management of depleted UF₆ (DOE 1999b).

DOE has proposed to design, construct, and operate conversion facilities at the Paducah Site and at the Portsmouth Plant in Ohio. These facilities would convert DOE's inventory of depleted UF₆ now located at Portsmouth, Paducah, and the ETTP in Oak Ridge, Tennessee, to triuranium octaoxide, uranium dioxide, uranium tetrafluoride, uranium metal, or some other stable chemical form acceptable for transportation, beneficial use/reuse, and/or disposal. A related objective is to provide cylinder surveillance and maintenance of the DOE inventory of depleted UF₆, low-enrichment UF₆, natural assay UF₆, and empty heel cylinders in a safe and environmentally acceptable manner.

DOE currently plans to prepare an environmental impact statement for the purpose of construction, operation, and D&D of two depleted UF₆ facilities at the Paducah and Portsmouth sites. Among the potential impacts to be analyzed in the document will be the cumulative impacts associated with the facilities at both sites.

5.1.5 Disposal of Nonradioactive Wastes Containing Residual Radioactivity at the C-746-U Landfill

DOE is currently preparing appropriate supplemental NEPA documentation pertaining to the establishment of authorized limits to determine the acceptability of nonradioactive waste containing residual activity at the C-746-U Landfill. DOE intends to complete an EA for this activity within the next several months. This will also include a cumulative impacts analysis.

5.1.6 Long-Term Management Plan for DOE's Inventory of Potentially Reusable Uranium

DOE is in the process of preparing a programmatic EA for the implementation of long-term management of its inventory of potentially reusable low enriched uranium, normal uranium, and depleted uranium that is in excess of national security needs. DOE's inventories of these materials reside at more than 100 different sites, including the Paducah Site. As part of the EA, DOE will determine the safest, most effective, and most efficient location for the long-term storage of this material. The uranium EA will also include a cumulative impacts analysis.

5.1.7 USEC Programs

The PGDP is the only operating uranium enrichment facility in the United States. Owned by DOE, it is leased and operated by the USEC, a wholly owned subsidiary of USEC Inc. The plant employs about 1,500 people and provides enrichment services for commercial nuclear power plants in the United States and around the world. In May 2001, USEC completed a plan to consolidate its uranium enrichment operations at Paducah. Portsmouth now provides sampling, transfer, and shipping services for USEC's customers.

5.2 OTHER REGIONAL INDUSTRIES ACTIVITIES

Cumulative effects are derived by analyzing potential risks from the proposed action in conjunction with potential risks from other activities at the Paducah Site (listed above) and other regional industries.

Other industries located in the area include TVA's Shawnee Steam Plant, Honeywell's Metropolis Works, USEC, and the Joppa Power Plant. Other new potential sources of environmental impacts foreseeable in either McCracken County or Massac County in the near future are included generically in the impacts analysis.

5.3 CUMULATIVE IMPACTS FROM THE PROPOSED ACTION

Potential cumulative impacts that could occur from the proposed action for the Paducah Site and the other regional activities are presented in the following sections.

5.3.1 Land Use

Impacts from the other actions described in the previous sections have the potential to affect land and facility use at the Paducah Site. Actions that occur outside of the Paducah Site security fence could limit the land and facilities that could be developed for other purposes. Direct incremental impacts of the proposed action on the development of other properties in the region are unlikely.

5.3.2 Air Quality

The proposed action in combination with the other area actions is unlikely to have major impacts on local or regional air quality. The existing air quality of the region is considered to be good. Air emissions from the other actions described previously would be expected to have only minor impacts and not violate any air quality permits. This is because the actions would be controlled, to a large extent, by engineering controls and adherence to applicable regulations.

5.3.3 Soil and Water Resources

No construction-related disturbance of natural soils would occur under the proposed action. Environmental restoration activities could result in impacts if soils are disturbed to remove or treat contamination. These types of impacts would be temporary and mitigated through the use of best management practices. Accidental spills and releases of hazardous materials could also potentially impact soils. Impacts to the surface water and groundwater resources could also occur during activities, but they also would be mitigated. None of the actions discussed previously would be expected to have major discharges of industrial effluents that could adversely impact water resources. The removal and treatment of contaminated soils and groundwater and the D&D of contaminated facilities at the Paducah Site could have a beneficial impact on these resources due to the removal of the source of contamination.

5.3.4 Ecological Resources

Forest fragmentation and its associated impacts on biodiversity are increasing as more land is developed. However, development of land parcels at the Paducah Site would cause only minor impacts because none of the areas contain habitats or biota that are considered rare or unique. Additionally, no federal- or state-listed threatened and endangered species are known to exist in the area where the previously described actions are located. Emissions and effluents from the operation of the proposed action should not be of sufficient quantity to have a major adverse impact (i.e., stress, impairment, injury, or mortality) on existing habitats and biota. Accidental releases from ongoing and proposed operations would not greatly impact ecological resources due to the implementation of adequate mitigative measures.

5.3.5 Socioeconomics and Environmental Justice

The creation of new commercial/industrial jobs in the vicinity of the Paducah Site could contribute to cumulative socioeconomic impacts by inducing in-migration to the area, with corresponding demands for housing and public services. However, such in-migration is not likely to result from the currently planned activities. Even with the new projects, ongoing downsizing and workforce restructuring would continue, and employment from some of the proposed actions would be only temporary. In addition to the new direct employment in the area, new indirect jobs would be generated because new direct employment would create the need for the goods and services that are provided by indirect workers. However, these new indirect jobs also are not likely to stimulate in-migration, because nearly all the new indirect positions could possibly be filled with unemployed persons residing in the area.

No cumulative environmental justice impacts are expected to occur from any of the actions considered in this analysis, including those proposals that would be located at the Paducah Site.

5.3.6 Infrastructure and Support Activities

Cumulative transportation impacts in the region surrounding the Paducah Site could occur from increased development and growth as well as off-site shipments of other materials. Implementation of the proposed action discussed previously would not require any major upgrades to existing transportation systems or major new construction of roads or rail facilities. The potential for CERCLA waste disposal at a new Paducah Site facility would decrease traffic associated with waste material shipments off-site. Peak-hour traffic volumes could increase slightly over current levels but would depend on total employment numbers.

Associated with increases in traffic is the potential for an increased number of accidents, additional noise and air pollution, and road deterioration and damage. The increase in average daily traffic volumes could result in inconveniences for other vehicles on affected routes and connecting roads. Commercial operations could suffer temporarily reduced business while customers avoid affected areas because of traffic delays. Increased pavement deterioration and damage could increase costs associated with maintaining or resurfacing roads. Although noise associated with increased traffic is not normally harmful to hearing, increased traffic noise is considered by the public to be a nuisance. Increased accidents put an additional strain on local emergency response personnel. Increased vehicular traffic also has the greatest potential to increase air pollution in the local area, because emissions from motor vehicles are poorly regulated.

Existing utilities are considered to be sufficient for the actions in the Paducah Site area. The water and wastewater treatment plants also have enough capacity to handle the actions. Some of the systems may need to be modified or require minor upgrades, but no major utility system modifications are expected.

5.3.7 Human Health and Accidents

Cumulative public and occupational health impacts would be expected to be equal to those that currently exist in the Paducah Site area. Actions that involve environmental remediation and D&D usually have a positive impact by eliminating or reducing potential exposures to existing contamination. However, a certain amount of risk and potential exposure is involved for the workers who participate in the implementation of actions. Emissions and effluents released from industrial developments would not be expected to be a major source of potential exposure and would be controlled through the use of proper engineering and administrative controls. Standard industrial accidents would increase proportionally to the increase in facility numbers and actions taking place. Further development of the surrounding area could cause an increase in the number of people that could be exposed to off-site releases from large accidents.

5.4 CUMULATIVE IMPACTS FROM THE NO ACTION ALTERNATIVE

Potential cumulative impacts that could occur from the No Action alternative for the Paducah Site and the other actions described in Sects. 5.1 and 5.2 are presented in this section.

5.4.1 Land Use

No new facilities, or notable changes in land use, are described under the No Action alternative. Incremental impacts of this alternative on the development of other properties in the region are unlikely.

5.4.2 Air Quality

The No Action alternative, in combination with other area actions, is unlikely to have major impacts on local or regional air quality. The existing air quality of the region is considered to be good, and no new effluents are expected from the No Action alternative.

5.4.3 Soil and Water Resources

No construction-related disturbance of natural soils immediately would occur under the No Action alternative. In the future, as new storage facilities are constructed, short-term soil disturbance would occur. This minor disturbance, associated with the No Action alternative, in combination with other area actions is unlikely to have impacts on local or regional soil and water resources. Environmental restoration activities combined with construction-related disturbances under the No Action alternative could result in impacts if large quantities of soils are disturbed to remove or treat contamination. These types of impacts would be temporary and mitigated through the use of best management practices.

Impacts to the surface water and groundwater resources are not expected to occur during No Action alternative activities. No discharges are anticipated from implementation of the No Action alternative. None of the regional actions discussed previously would be expected to have major discharges of industrial effluents that could adversely impact water resources.

The removal and treatment of contaminated soils and groundwater and the D&D of contaminated facilities at the Paducah Site could have a beneficial impact on these resources due to the removal of the source of contamination.

5.4.4 Ecological Resources

Eventual construction of storage facilities on land parcels at the Paducah Site might cause minor impacts to the ecological resources of the area. Habitat loss and wildlife displacement would occur as a result of increased human presence at the new facility site. NEPA review would be conducted prior to construction startup to determine that the proposed construction site does not contain habitats and/or biota that are considered rare or unique.

No emissions or effluents from implementation of the No Action are expected. Accidental releases from ongoing operations on the site or in the region would not greatly impact ecological resources due to the implementation of adequate site controls.

5.4.5 Socioeconomics and Environmental Justice

In-migration of workers is not likely to result from the No Action alternative combined with regional activities. Any workforce increase would be offset by ongoing downsizing and workforce restructuring.

Employment from some of the actions would be only temporary. In addition to any new direct employment in the area, new indirect jobs would be generated because new direct employment would create the need for the goods and services that are provided by indirect workers. These new indirect jobs, however, also are not likely to stimulate in-migration, because nearly all the new indirect positions could possibly be filled with unemployed persons residing in the area.

No cumulative environmental justice impacts are expected to occur from any of the actions considered in this analysis, including the No Action alternative.

5.4.6 Infrastructure and Support Activities

Cumulative transportation impacts in the region surrounding the Paducah Site could occur from increased development and growth. No transportation impacts from implementation of the No Action alternative are anticipated, therefore, no major upgrades to existing transportation systems or major new construction of roads or rail facilities would be necessary.

No additional utility resources are required for the No Action alternative implementation. Existing utilities are considered to be sufficient for the actions in the Paducah Site area.

5.4.7 Human Health and Accidents

Cumulative public and occupational health impacts would be expected to be equal to those that currently exist in the Paducah Site area. The No Action alternative would result in keeping wastes on the Paducah Site. This results in more potential human health impacts than the proposed action since the proposed action would be removing wastes from the Paducah Site, thereby decreasing the human health impacts.

Actions that involve environmental remediation and D&D usually have a positive impact by eliminating or reducing potential exposures to existing contamination. A certain amount of risk and potential exposure, however, is involved for the workers who participate in the implementation of actions.

No emissions and effluents are expected to be released under the No Action alternative. Emissions and effluents from industrial developments would not be expected to be a major source of potential exposure and would be controlled through the use of proper engineering and administrative controls. Standard industrial accidents would increase proportionally to the increase in facility numbers and actions taking place. Further development of the surrounding area could cause an increase in the number of people that could be exposed to off-site releases from large accidents.

5.5 CUMULATIVE IMPACTS FROM THE ENHANCED STORAGE ALTERNATIVE

Potential cumulative impacts to land use, air quality, soil and water resources, ecological resources, socioeconomics, and area infrastructure from the Enhanced Storage alternative, in combination with other regional actions described in Sects. 5.1 and 5.2, are identical to the cumulative impacts described for the No Action alternative in Sect. 5.4. Both alternatives would affect these resources primarily through the construction of new storage facilities. The one area where these two alternatives differ is the potential cumulative human health and accident impacts.

5.5.1 Human Health and Accidents

Keeping the waste on site in an enhanced facility would increase the waste inventory that could be released during a catastrophe. This results in more potential human health impacts than the proposed

action since the proposed action would be removing wastes and risks from the Paducah Site. The enhanced storage facility, however, would decrease potential human impacts by more strictly controlling storage area access, withstanding potential disasters (i.e. earthquakes), and containing container breeches more completely than standard storage buildings. Cumulative public and occupational health impacts would be expected to be less than those that currently exist in the Paducah Site area.

5.6 CUMULATIVE IMPACTS COMPARISON

It should be noted that none of the three alternatives result in notable impacts to the area's resources. For comparison purposes, however, the table below summarizes defined potential cumulative impacts of each alternative when combined with other regional activities. Each alternative is ranked between 1 and 3, with 1 indicating the least potential impact identified and 3 indicating the most impact when compared among the three alternatives. For example, the alternative with the most 1s would pose the least impact to resources when compared to the other two alternatives.

Table 5.1. Cumulative impacts comparison

| Alternative | Land use | Air quality | Soil/water resources | Ecological resources | Socioeconomics | Infrastructure | Human health | Cumulative rank |
|--------------------|-----------------|--------------------|-----------------------------|-----------------------------|-----------------------|-----------------------|---------------------|------------------------|
| Proposed | 1 | 3 | 1 | 1 | 1 | 3 | 1 | 1 |
| No Action | 2 | 2 | 3 | 3 | 2 | 1 | 3 | 3 |
| Enhanced Storage | 3 | 1 | 2 | 2 | 3 | 2 | 2 | 2 |